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### **Oxidative stress and mitochondrial dysfunction in Autism: Impact of genetic and environmental factors**

Autism spectrum disorders are behaviorally defined neurodevelopmental disorders. Recent evidence suggests that oxidative stress may provide a link between susceptibility genes and pre- and post-natal environmental risk factors in the pathophysiology of autism. The free radicals, i.e., reactive oxygen species (ROS) are generated endogenously during oxidative metabolism and energy (ATP) production by mitochondria. Our previous studies have shown increased lipid peroxidation and reduced levels of antioxidant proteins, namely, ceruloplasmin and transferrin in the plasma from children with autism. Brain tissue is highly heterogeneous with different functions localized in specific areas of brain. We also compared the status of ROS-mediated oxidative damage and expression of mitochondrial electron transport chain (ETC) complexes in postmortem brain tissue samples from the cerebellum and frontal, temporal, parietal and occipital cortices of autistic subjects and age-matched normal subjects. The oxidation of lipid, protein and DNA was significantly increased in temporal cortex and cerebellum in autism as compared with controls. An increase in protein and DNA oxidation was also observed in frontal cortex in autism. On the other hand, parietal and occipital cortices were unaffected in autism. Recently, we reported significantly lower levels of complexes III and V in the cerebellum, of complex I in the frontal cortex, and of complexes II, III, and V in the temporal cortex of children with autism as compared to age-matched control subjects, while none of the five ETC complexes was affected in the parietal and occipital cortices in subjects with autism. Our results suggest brain region-specific deficit in mitochondrial ETC complexes and oxidative damage in children with autism. In this presentation, the potential role of genetic and environmental factors in increasing the vulnerability to oxidative stress in autism will also be discussed.

#### **Biography**

Dr. Abha Chauhan is Head of the Developmental Neuroscience Laboratory at the NYS Institute for Basic Research in Developmental Disabilities, Staten Island, New York. She received her Ph.D. in 1983 from Post Graduate Institute of Medical Education and Research, India. Dr. Chauhan has published over 60 research articles, and is the editor of a book entitled "Autism: Oxidative stress, inflammation and immune abnormalities." and of a "Special Issue on Autism Spectrum Disorders." Dr. Chauhan has also organized and chaired symposiums on "Oxidative Stress and Inflammation in Autism Spectrum Disorders." For her work on autism, she has been awarded research grants as Principal Investigator from Department of Defense, Autism Speaks and Autism Research Institute.

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